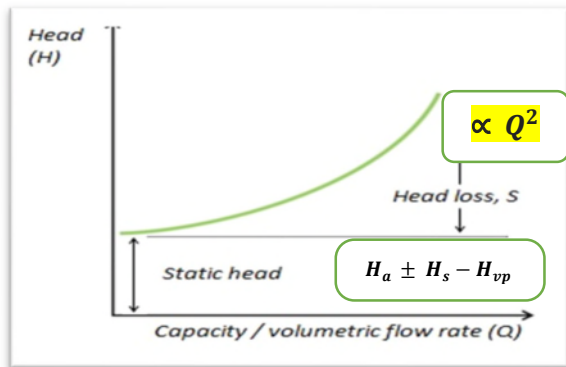


NPSH and Cavitation – Common **misconceptions** and **clarifications**

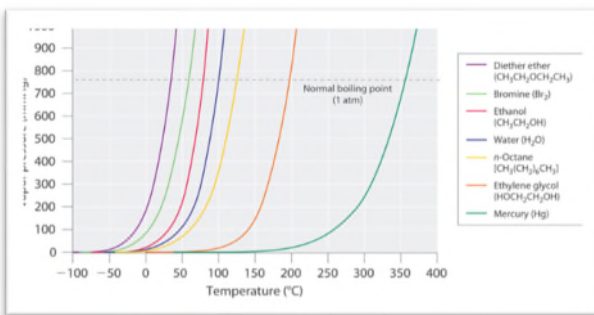
NPSH available is not just a constant value given in the datasheet



- Suction head / NPSH available consists of static and dynamic head.
- Dynamic head or head loss across the suction systems (piping, valves, elbows, strainer, reducer etc) would vary in square proportion of operating flow (Velocity)
- Dynamic Head loss across the system at 10% and 20% higher flow would increase by 21% and 44% respectively!!
- If nature of product (viscosity or density) changes, it affects the friction factor and resultant head loss. Sometimes that may be noticeable.
- Surface roughness of the piping expected to degrade over a long period of time that may result into higher friction losses and lower NPSH available.

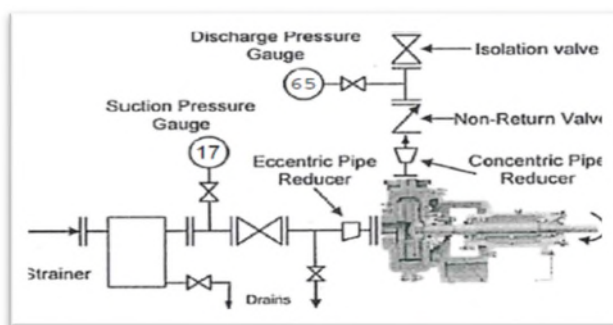
Actual NPSH available value vary with operating temperature

$$NPSH_a = H_a \pm H_s - H_{vp} - H_f$$



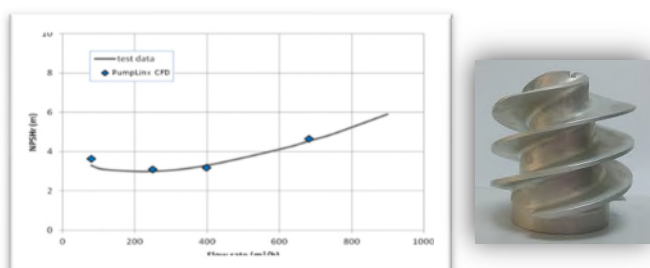
- Vapor pressure being considered in the data sheet is at specific operating temperature.
- If actual operating temperature is higher, vapor pressure would also increase and that would lead to low NPSH available than anticipated.
- It is very important point, while handling light HC or product at sub-zero temperature. Suction temperature at source could be normal but while it reaches to pump casing sometimes it may increase by few deg C, if suction system is not properly insulated.
- It is very common to find pumps without proper instrumentations to monitor suction temperature.

Suction strainer is the best friend and the worst enemy of pump.



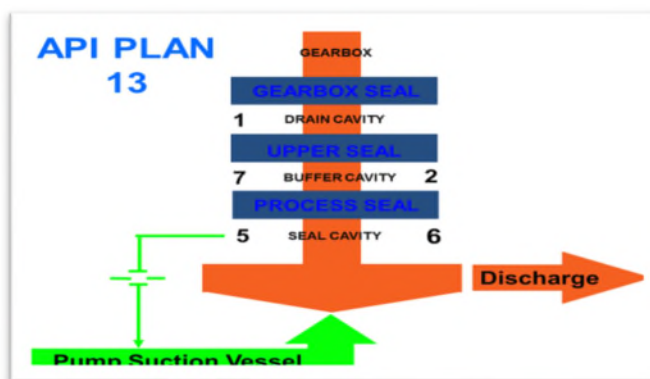
- Suction strainer is a good friend of pump, protect from solid, lump and foreign material. However, if not selected or maintained properly, it may prove as the worst enemy.
- In the above NPSH_a formula, suction strainer loss is either not considered or assumed to be very low whereas while fine mesh get choked Diff. pressure across the strainer goes very high.
- In many a cases pressure gauge is not available on downstream of suction strainer so not possible to know the strainer condition without physical inspection.

Actual NPSHr could be different than the NPSHr value specified in the datasheet



- NPSHr value given in the data sheet is for the specific rated condition.
- NPSHr increases with increase in operating flow. Referring NPSHr Vs flow curve is important.
- NPSHr also increase on extreme left side to BEP, close to Minimum continuous flow region. Internal recirculation at impeller suction would generate excessive heat and may lead to low flow cavitation.
- Inducer can improve the NPSH requirement at rated point. At the same time, it may affect the allowable operating region.

Pump Start up venting matters



- Proper venting of centrifugal pump is essential while handling HC especially at low / subzero temperature.
- It is not all about the open casing or seal vent line for some time and close it. It is to ensure no vapor or gas hold up inside the casing or mechanical seal cavity.
- While pump is on standby with suction valve open, there is a possibility of huge amount of HC hold up in suction piping, casing, and seal cavity. Venting may be required for extended time than normal practice.
- If piping and pumps are not insulated and ambient temperature is comparatively high, situation may get worse while change over. Continuous venting - Plan 13M may help to improve the situation.